ciena

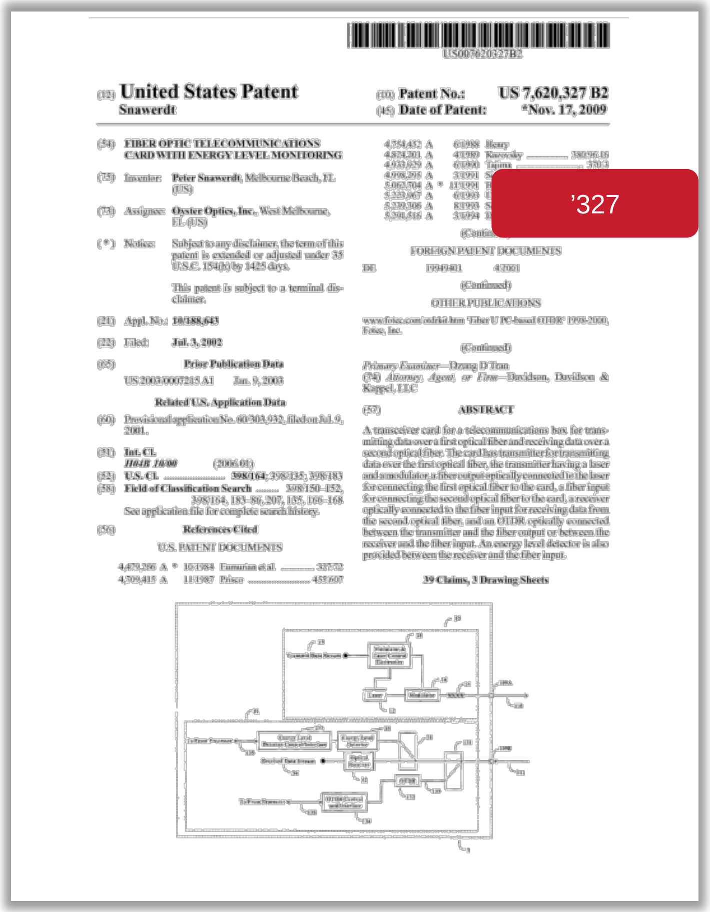
Ciena's *Markman* Presentation

4:17-cv-05920-JSW

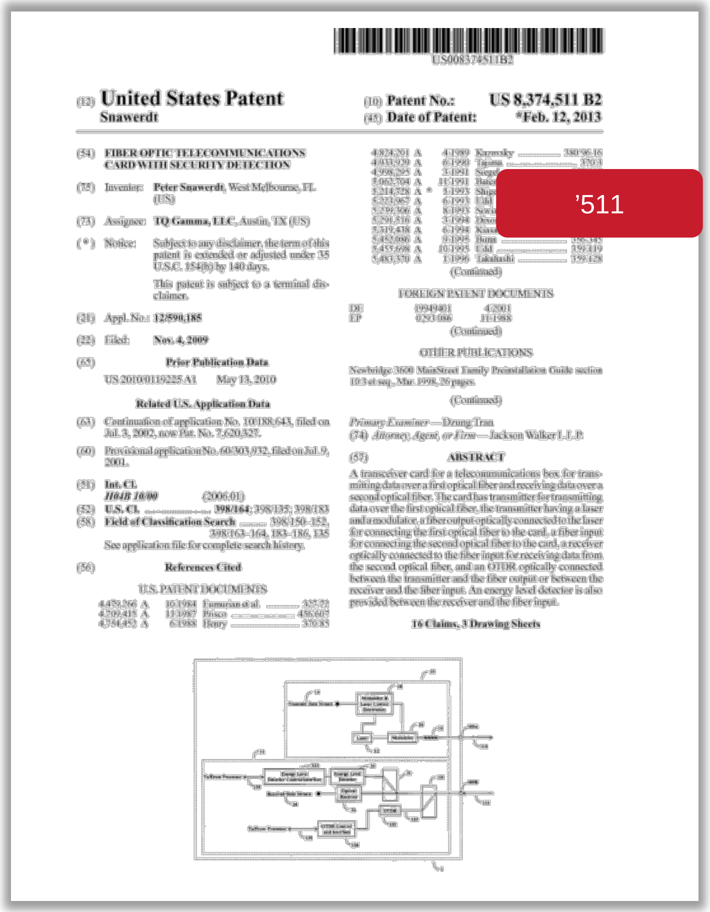
July 23, 2020

Asserted Patents: U.S. Patent Nos. 7,620,327; 8,374,511; 8,913,898

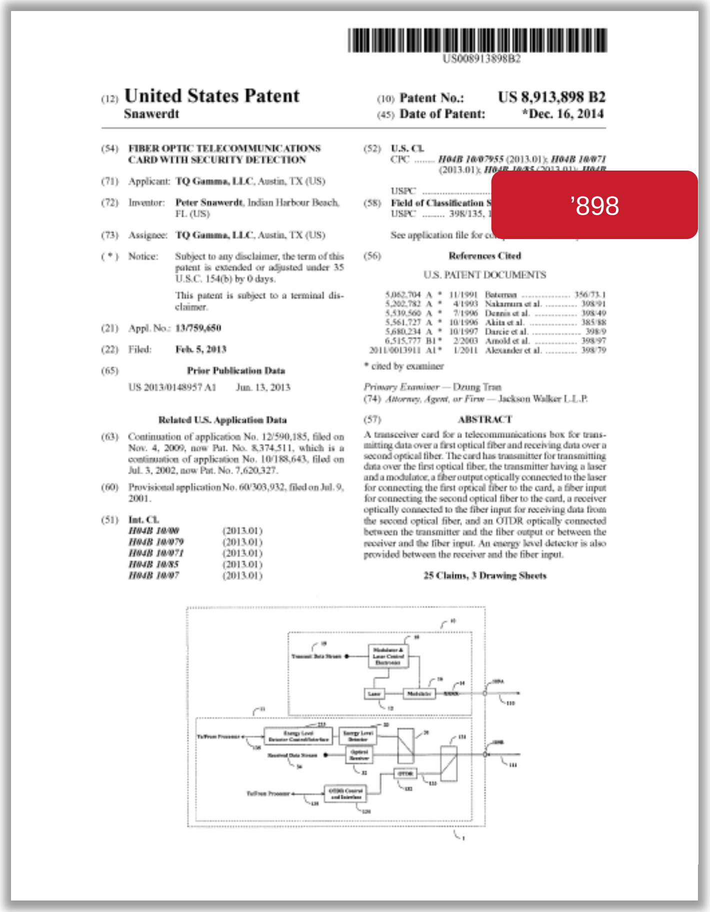
FIBER OPTIC TELECOMMUNICATIONS CARD *WITH ENERGY LEVEL MONITORING*



Parent



First Continuation



Second Continuation

THE OPTICAL SIGNALS

’327 PATENT AT CLAIMS 1, 14, 25, 36

Oyster’s Proposed Construction	Ciena’s Proposed Construction
“the optical data signals received on the fiber input from the second optical fiber”	“transmitting optical signals” is the antecedent basis for “the optical signals” Otherwise, indefinite

<u>Tentative Construction</u>:
“the optical data signals received on the fiber input from the second optical fiber”

THE DISPUTE IS NOT WHETHER THE OPTICAL SIGNALS REFERS TO THE *TRANSMITTED* OR *RECEIVED* OPTICAL SIGNALS; INSTEAD, IT IS WHAT IS THE SOURCE OF THE CLAIMED OPTICAL SIGNALS?

The Specification Does Not Expressly Identify The Source of "The Optical Signals" Measured by The Energy Level Detector

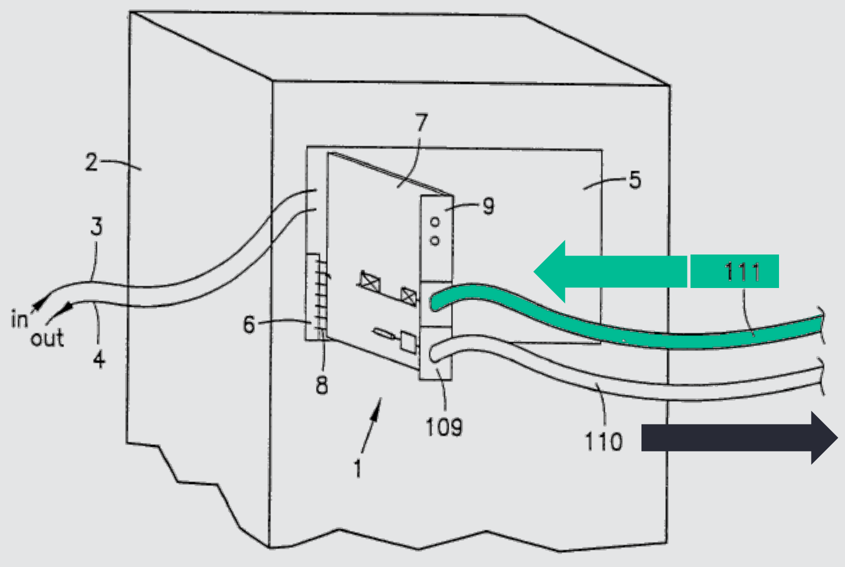
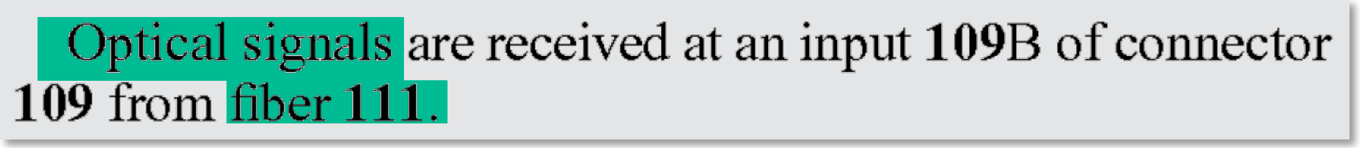


Fig. 1

'327 Patent at Fig. 1.



Optical signals are received at an input 109B of connector 109 from fiber 111.

'327 Patent at 4:48-49.

The Source of The Optical Signals Measured By The Energy Level Detector is Not Disclosed

- Three Permutations:
  1. (Ciena's Proposal) The claimed "transmitter"
  2. (Oyster's Proposal) An undisclosed and unclaimed transmitter
  3. Unclear, thus rendering the claims indefinite

The Claims Expressly State That The Energy Level Detector Measures Energy Level of "The Optical Signals"

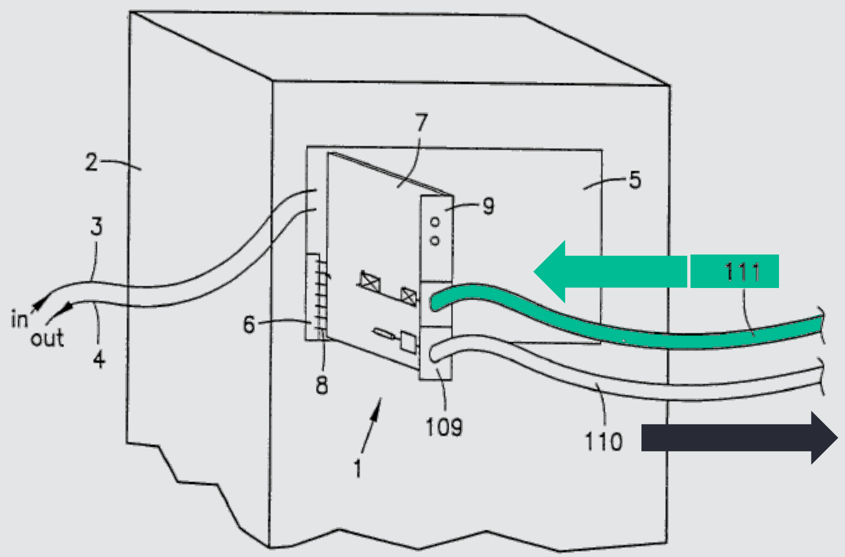


Fig. 1

'327 Patent at Fig. 1.

1. A transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber, the card comprising:
   - a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data;
   - a fiber output optically connected to the laser for connecting the first optical fiber to the card;
   - a fiber input for connecting the second optical fiber to the card;
   - a receiver optically connected to the fiber input for receiving data from the second optical fiber; and
   - an energy level detector optically connected between the receiver and the fiber input to measure an energy level of the optical signals, wherein the energy level detector includes a plurality of thresholds.

'327 Patent at 6:45-64.

HOW DOES THE REMAINDER OF THE PROSECUTION HISTORY INFORM "THE OPTICAL SIGNALS" CONSTRUCTION?

The Public Notice Function Requires That Patentee Be Held to What Was Expressly Claimed

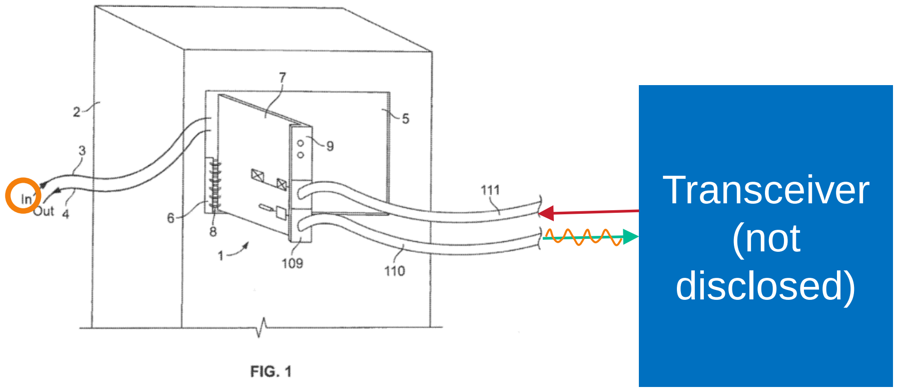


FIG. 1

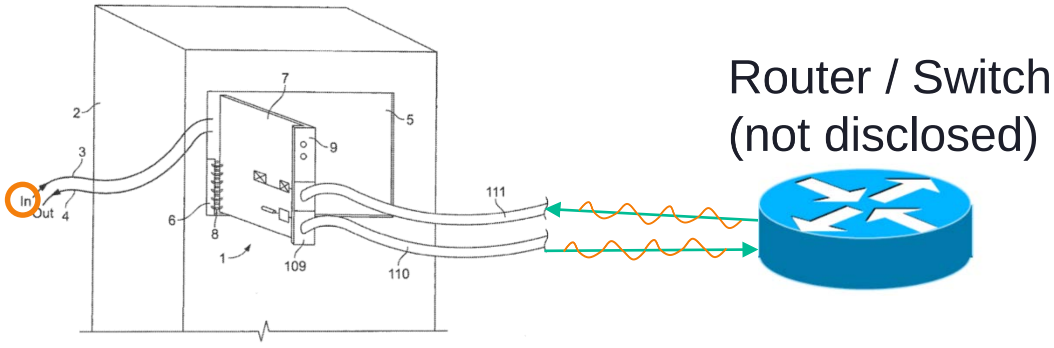


FIG. 1

’327 Patent (Oyster’s Construction)	’327 Patent (Ciena’s Construction)
1. A transceiver card for a telecommunications box . . .	1. A transceiver card for a telecommunications box . . .
a transmitter . . . having a laser, a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data; . . .	a transmitter . . . having a laser, a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data; . . .
a receiver optically connected to the fiber input for receiving data from the second optical fiber; and	a receiver optically connected to the fiber input for receiving data from the second optical fiber; and
an energy level detector optically connected between the receiver and the fiber input to measure an energy level of the optical [data] signals, wherein the energy level detector includes a plurality of thresholds.	an energy level detector optically connected between the receiver and the fiber input to measure an energy level of the optical signals, wherein the energy level detector includes a plurality of thresholds.

The Applicant Simultaneously Amended The Claims to Claim that the Transmitter Transmits "Optical Signals" and the Energy Level Detector Measures "The Optical Signals"

Claim 22 (currently amended): A transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber, the card comprising:

a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, ~~and~~ a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data;

***

an energy level detector optically connected between the receiver and the fiber input to measure an energy level of the optical signals, wherein the energy level detector includes a plurality of thresholds.

Amendment Dated Feb, 17, 2009 at page 2.

Applicant, In the Same Amendment, Specially Explained to the Examiner that the Energy Level Detector Measures "the Transmitted Optical Signals"

Without prejudice to a continuation application, however, applicants have amended the claims to recite "a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, ~~and~~ a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data" and "an energy level detector" to measure an energy level of the transmitted optical signals. See claims 22 and 34.

Amendment Dated Feb, 17, 2009 at page 10.

The PTAB Expressly Found That The Source of "The Optical Signals" in the Claims Was the Transmitter

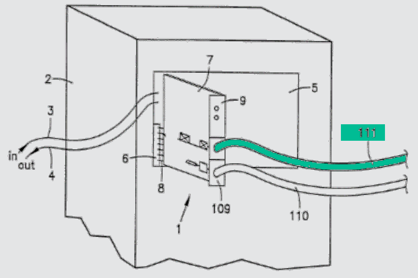


Fig. 1

'327 Patent at Fig. 1.

The question is not whether the second optical fiber also carries optical signals, but what has been expressly identified or introduced by the claims as optical signals that is the antecedent basis for the later reference to "the optical signals," of which the energy level detector measures the energy level. Only the signals transmitted by the recited transmitter have been specifically identified in claims 1, 14, 25, and 36 as "optical signals," and, as discussed above, the prosecution history reflects that applicants specifically explained "the optical signals" in these claims as being those signals transmitted by the transmitter. We are not persuaded to ignore an express identification and articulation of "optical signals," to regard as the referenced optical signals some other item that has not been affirmatively introduced in the claims as "optical signals."

Ex. P at 14 (PTAB Decision IPR2017-02173 Paper No. 12).

The Public Notice Function Is Violated By Oyster's Proposed Construction That Requires The Existence of Another, Undisclosed, Transceiver

"The public notice function of a patent and its prosecution history requires that a patentee be held to what he declares during the prosecution of his patent." *Springs Window Fashions LP v. Novo Indus., L.P.,* 323 F.3d 989, 995 (Fed.Cir.2003). We have held patentees to statements containing errors made during prosecution where, for example, nothing in the statement was at odds with the plain language of the claims or the specification. *See id.* at 995–96; *see also Hockerson–Halberstadt, Inc. v. Avia Grp. Int'l, Inc.,* 222 F.3d 951, 957 (Fed.Cir.2000) (rejecting patentee's "request for a mulligan that would erase from the prosecution history the inventor's disavowal of a particular aspect of a claim term's meaning" despite patentee's argument that a person of ordinary skill would have understood the statement during prosecution to be erroneous).

***Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1344 (Fed. Cir. 2015)**

The PTAB Interpreted The Notice Function to Require "The Optical Signals" to Mean the "Optical Signals Transmitted By Recited Transmitter"

strikethrough to indicate deletion) (emphasis added). The above-quoted text indicates that applicants introduced the language "the transmitter transmitting optical signals" and the reference to "the optical signals" at the same time and in a complementary manner, and further specifically explained the added language "the optical signals" as "the transmitted optical signals." Both the claim language on its face as well as the prosecution history are plain and unambiguous that "the optical signals," of which the energy level detector measures the energy level, refers to optical signals transmitted by the recited transmitter on the transceiver card. This is the only reasonable conclusion supported by the intrinsic evidence.

To conclude differently would undermine the clear notice provided by the claims, as well as the prosecution history, to the public with regard to the scope of coverage of these claims. In summary, we find the claim language

Ex. P at 13 (PTAB Decision IPR2017-02173 Paper No. 12).

Dr. Lebby Admits That Transceivers Were Operable Under Ciena's Proposed Construction

Q Okay. In what scenarios would a transceiver card transmit optical signals out on one fiber and receive those signals back on another fiber?

A In many optical architectures in a network system, a transceiver card will send an optical signal out to what is known as a optical switch or a switch or a router. And that would route the signals to the destination. In a similar way, another transceiver card somewhere else could send signals via the same router or even a different router and receive those signals on the initial transceiver card. So it's a communications link.

Ex. FF 98:5-19.

"So, yes, there are situations in the industry where an optical signal would leave a transceiver card and enter that same card."

Ex. FF 98:19-99:4

Oyster's Diagnostic Signal Argument Is A Red Herring – The Optical Signals Recited In The Patents Are Data Communication Signals, *Not* Diagnostic Signals

What the paragraph explains is that while the prior art reference Darcie is for reading a diagnostic signal when measuring optical power, the claimed invention measures the optical power of a regular data communication signal. In that regard, each of independent claims 1, 14, 25, and 36 recites: "the transmitter transmitting optical signals for telecommunication as a function of the input data." Thus, the optical signals expressly recited as transmitted by the transmitter are data communication signals (i.e., not the diagnostic signals such as those in Darcie distinguished by the Applicants).

Ex. P at 16 (PTAB Decision IPR2017-02173 Paper No. 12).

FOLLOWING THE CLAIM AMENDMENT THAT ADDED THE DISPUTED LIMITATION, THE EXAMINER REJECTED THE CLAIMS OVER U.S. PATENT NO. 7,099,592 TO SNAWERDT. (MAY 11, 2009 REJECTION.) DOES SNAWERDT DESCRIBE MEASURING THE ENERGY OF THE TRANSMITTED OPTICAL SIGNAL OR THE RECEIVED?

Snawerdt Is Very Similar to the Asserted Patents And Does Not Expressly Disclose the Source of the Optical Signal Measured by The Energy Level Detector

Detector **33** monitors the light energy in the fiber **111** via the light energy coupled to the detector by splitter **31**. If the amplitude drops during this mode, most likely from a tap, the detector **33** provides an alert and can, for example, sound an alarm or alert network maintenance personnel, for example through an LED **133**. Another LED **134** can provide an indication of proper signal reception.

’592 patent at 4:49-55.

Optical signals are received at an input **109**B of connector **109** from fiber **111**.

’592 Patent at 4:38-39.

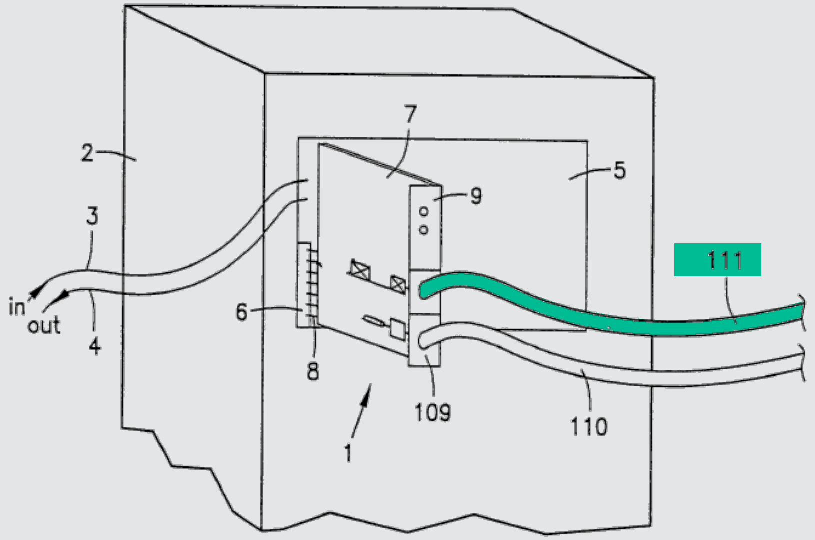


Fig. 1

’592 Patent at Fig. 1.

Snawerdt Simultaneously Refers to Transmitting In A Secure Mode And Reading A Signal With A Constant Energy Level

Preferably, an energy level detector is also provided on the card for measuring light energy in a fiber. Because the transmitter is typically transmitting in secure mode using a continuous wave laser, the energy level read by the detector should be constant. When a drop in the energy level is

’592 patent at 2:63-67

The Only Source of A “Secure Mode” Transmitter is on the Same Card As the Receiver

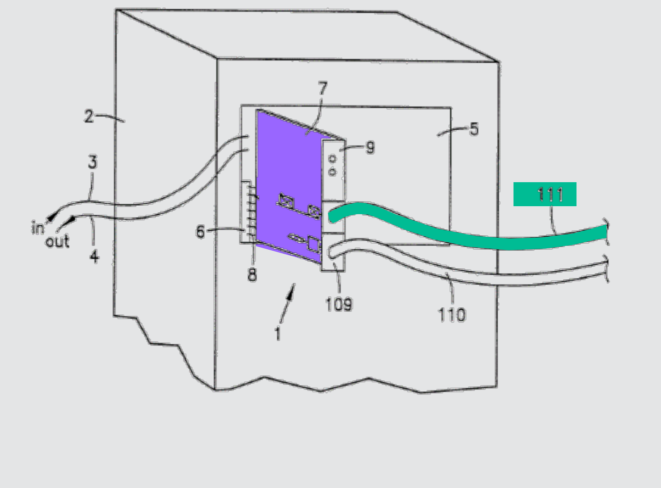


Fig. 1

’592 Patent at Fig. 1.

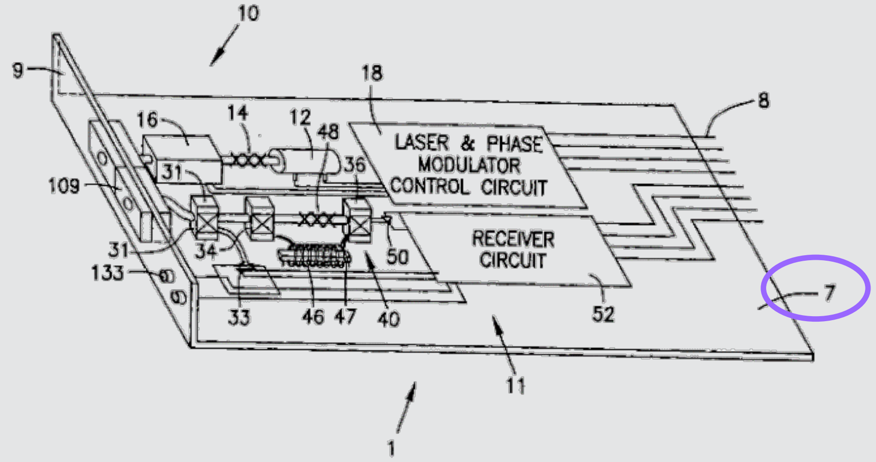


Fig. 2

’592 Patent at Fig. 2.

THE PARTIES AGREE THAT THE TERM “THE OPTICAL SIGNALS” IN THE ’511 PATENT REFERS TO “THE OPTICAL SIGNAL TRANSMITTED BY THE TRANSMITTER.” DOES OYSTER CONTEND THAT THESE CLAIMS ARE INOPERABLE OR EXCLUDE PREFERRED EMBODIMENTS?

The ’511 Patent Attempts To Cure The Absence of Undisclosed Additional Hardware In The Asserted Patents By Adding a Claimed “Further Telecommunications Box”

’511 Patent Embodiment

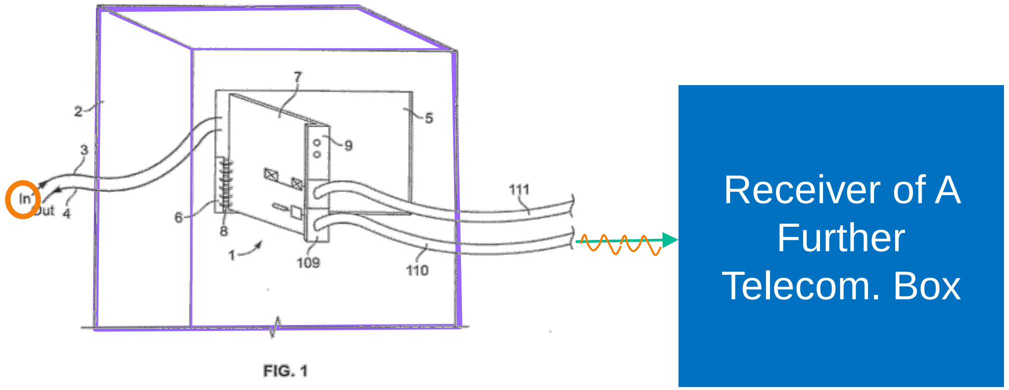


FIG. 1

The “further telecommunications box” is not disclosed in the patent specification.

’511 Patent
1. A method for operating an optical fiber multiplexor comprising:
feeding input data to a controller of a transmitter of ***a telecommunications box***, . . .
using the controller, controlling a modulator to modulate light from a laser as a function of the input data;
sending the modulated light as an optical signal from the transmitter over an optical fiber;
receiving the optical signals from the optical fiber at a receiver of a further telecommunications box and converting the optical signals to electronic output data;
passing the optical signals to a photodetector to produce an electric signal; and
filtering the electrical signal to produce an average optical power.

CLAIMS 9 AND 33 OF THE ’327 PATENT DESCRIBE THE THRESHOLDS IN THE ENERGY LEVEL DETECTOR “BOUND[ING] AN ACCEPTABLE ENERGY RANGE FOR THE RECEIVED LIGHT.” CAN THESE CLAIMS BE RECONCILED WITH CIENA’S CONSTRUCTION?

The Optical Signals Include Light Therefore “The Received Light” Has Antecedent Basis

- Claim 9: “The card as recited in claim 1 wherein the plurality of thresholds bound an acceptable energy range for the received light.”

- The “light” is a property of the “optical signals” transmitted by the transmitter, particularly because Claim 1 includes a laser. When those same signals are received by the receiver, the receiver inherently receives light.

The Received Light Claims Are Consistent With Ciena's Construction

'327 Patent Embodiment

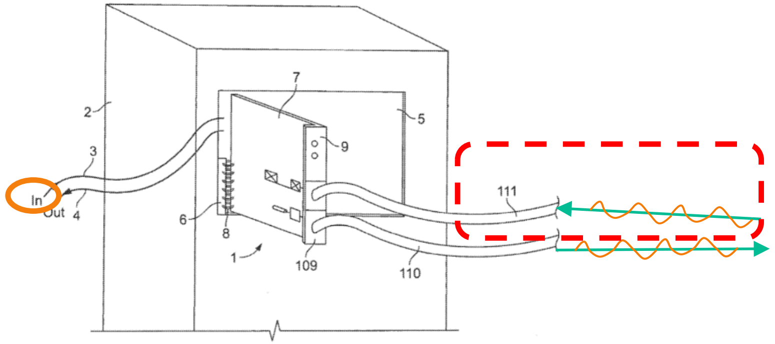
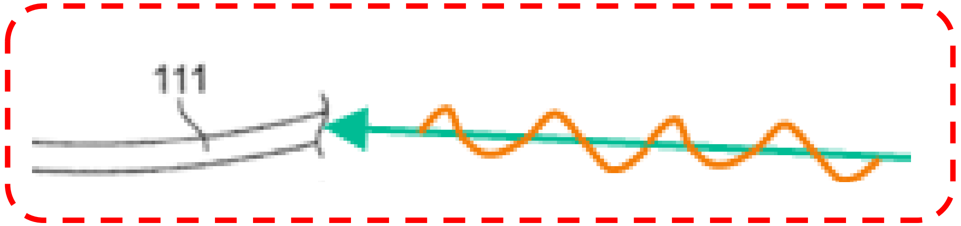


FIG. 1



"the optical signals" received by the energy level detector are necessarily in the form of light. Thus, "the received light" has antecedent basis.

'327 Patent	
1. A transceiver card for a telecommunications box . . .	Claim 9: The card as recited in claim 1 wherein the plurality of thresholds bound an acceptable energy range for the received light."
a transmitter . . . having a laser, a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of the input data; . . .	
a receiver optically connected to the fiber input for receiving data from the second optical fiber; and	
an energy level detector optically connected between the receiver and the fiber input to measure an energy level of the optical signals, wherein the energy level detector includes a plurality of thresholds.	

RECEIVER

’327 PATENT AT CLAIMS 1, 14, 25, 36
’511 PATENT AT CLAIMS 1, 9

Oyster’s Proposed Construction	Ciena’s Proposed Construction
’898 Patent: “receiver without a demodulator” ’327 and ’511 Patents: No construction necessary	“receiver without a demodulator”

Tentative Construction:
’898 Patent: “receiver without a demodulator”
’327 and ’511 Patents: No construction necessary

ASSUMING THAT ONLY THE [*MICROSOFT*] "RELEVANCE" STANDARD APPLIES, DOES THE PATENTEE'S ACQUIESCENCE THAT THE SPECIFICATION DOES NOT ENABLE RECEIVERS WITH DEMODULATORS JUSTIFY LIMITING THE SCOPE OF THE INVENTIONS?

The Examiner Rejected the “Receiver” Limitation as Not Enabled

3. Claims 18, 31, 45, 53 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 18, 31, 45, 53 claimed "a receiver having a demodulator” which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Ex. J (Non-Final Office Action Dated June 26, 2013 at page 3)

Oyster Acquiesced to the Rejection and Amended the Claims to Comply with the Enablement Requirement of Section 112

18. (**currently amended**) A transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber, the transceiver card comprising:

a transmitter having a laser, a modulator, and a controller configured to receive input data and control the modulator to generate a first optical signal as a function of the input data;

a fiber output optically connected to the transmitter and configured to optically connect the first optical fiber to the transceiver card;

a receiver **~~having a demodulator~~** configured to receive a second optical signal from the second optical fiber and **~~demodulate~~** **<u>to convert</u>** the second optical signal to **~~produce~~** output data;

Ex. K (Amendment Dated October 21, 2013 at page 2 (note substantially identical amendments to other claims at pages 4, 6, 7)

<u>Rejections under 35 U.S.C. §112 (pre-AIA), first paragraph</u>

Claims 18, 31, 45, and 53 were rejected under 35 U.S.C. §112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. Assignee has amended claims 18, 31, 45, and 53. Amended claims 18, 31, 45, and 53 comply with the requirements of Section 112 (pre-AIA), first paragraph. Accordingly, Assignee respectfully requests the Office to reconsider and withdraw the Section 112 (pre-AIA), first paragraph rejection of claims 18, 31, 45, and 53.

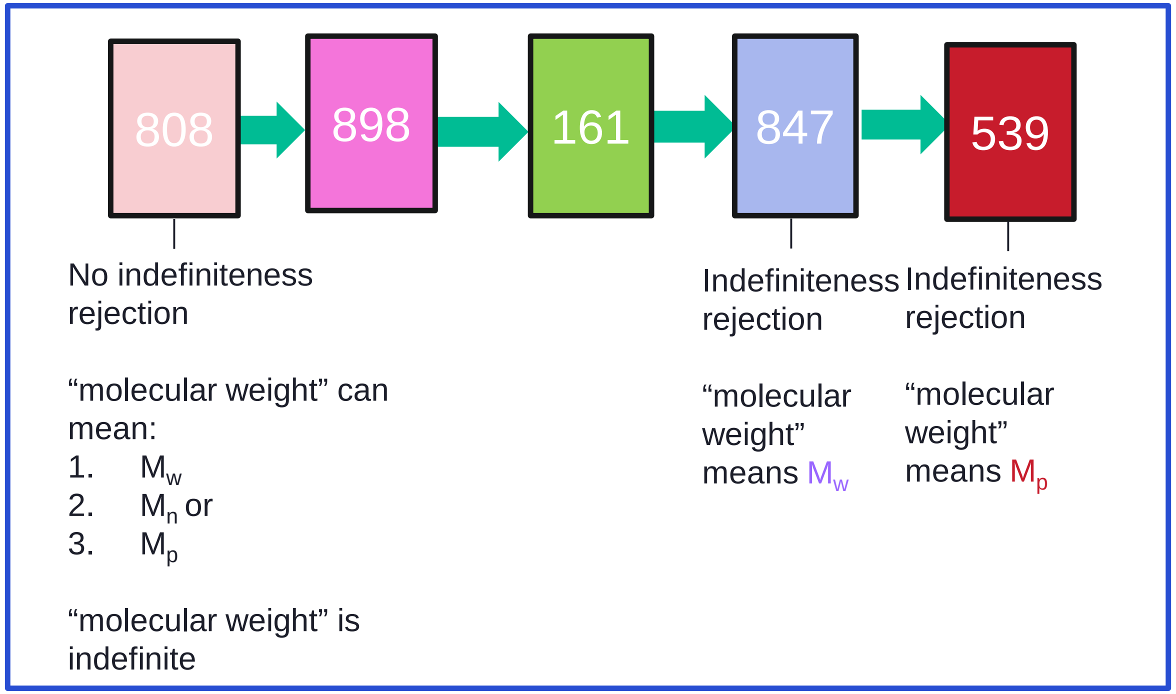
Ex. K (Amendment Dated October 21, 2013 at page 8)

Oyster's Acquiescence Confirms Claims of the '327 and '511 Patents Will Be Invalid Under Oyster's Construction – This is Of Tantamount Relevance

- All asserted patents share the same specification
- Oyster's acquiescence that the specification of the '898 patent lacks an enabling disclosure under Section 112 of a "receiver having a demodulator" applies to the scope of the specification common to all three patents
- This logically means that the scope of the '327 and '511 patent claims is the same as the '898 patent and cannot include a receiver having a demodulator, as this would render the claims non-enabled as a matter of law
- The Federal Circuit applies *Microsoft's* relevance standard to Section 112 issues.

Teva Pharms. USA, Inc. v. Sandoz, Inc., 789 F.3d 1335, 1343 (Fed. Cir. 2015)

Teva Applied *Microsoft's* Relevance Standard to a Section 112 Issue When Construing a Term in An Earlier Issued Patent



"A statement made during prosecution of related patents may be properly considered in construing a term common to those patents, ***regardless*** *of whether the statement pre- or post-dates the issuance of the particular patent at issue.*"

Teva Pharms. USA, Inc. v. Sandoz, Inc., 789 F.3d 1335, 1343 (Fed. Cir. 2015)

Oyster's Acquiescence on Enablement Limits the Scope of the Inventions Consistent with Federal Circuit Precedent

"Claim construction should not, of course, be blind to validity issues claims should be so construed, if possible, as to sustain their validity. A claim that is interpreted too broadly will run into validity issues, providing motivation for the construing court to choose a narrower interpretation if possible."

MBO Labs., Inc. v. Becton, Dickinson & Co., 474 F.3d 1323, 1332 (Fed. Cir. 2007)

Federal Circuit affirming district court that "properly limited the scope of [a] claim term" based on an admitted lack of enablement.

Biogen Idec, Inc. v. GlaxoSmithKline LLC, 713 F.3d 1090, 1095–97 (Fed. Cir. 2013)

Federal Circuit limited claim scope based on the only system described and enabled in the specification: "claims are not properly construed to have a meaning or scope that would lead to their invalidity for failure to satisfy the requirements of patentability."

Wang Lab., Inc. v. America Online, Inc., 197 F.3d 1377, 1382 (Fed. Cir. 1999)

DOES THE POLICY JUSTIFICATION FOR PROTECTING THE PUBLIC'S RELIANCE ON DEFINITIVE STATEMENTS IN THE PROSECUTION HISTORY APPLY?

The Notice Function of Protecting The Public's Reliance on Definitive Statements Applies to Oyster's Acquiescence

Ciena proposes a narrower and enabled construction of receiver while Oyster proposes a broader and non-enabled construction:

1. **Oyster** - Receiver with or without a demodulator (not enabled)
2. **Ciena** - Receiver without a demodulator (enabled)

"Where there is an equal choice between a broader and a narrower meaning of a claim, and **there is an enabling disclosure that indicates that the applicant is at least entitled to a claim having the narrower meaning**, **we consider the notice function of the claim to be best served by adopting the narrower meaning**."

Athletic Alternatives, Inc. v. Prince Mfg., Inv., 73 F.3d 1573, 1581 (Fed. Cir. 1996)

The Policy Justification of Protecting The Public's Reliance on Definitive Statements Applies to Oyster's Acquiescence

As a matter of public policy, an applicant's acquiescence to the Examiner's interpretation of the claims will limit the scope of the claims.

TorPharm, Inc. v. Ranbaxy Pharm., Inc., 336 F.3d 1322, 1330 (Fed. Cir. 2003) ("the public is entitled to equate an inventor's acquiescence to the examiner's narrow view of patentable subject matter with abandonment of the rest")

Inverness Med. Switz. GmbH v. Warner Lambert Co., 309 F.3d 1373, 1380 (Fed. Cir. 2002) ("To be sure, failure to object to an examiner's interpretation of a claim ordinarily disclaims a broader interpretation");

“RECEIVER CONFIGURED . . . TO CONVERT THE SECOND OPTICAL SIGNAL TO OUTPUT DATA”

’898 PATENT AT CLAIMS 1, 14

Oyster’s Proposed Construction	Ciena’s Proposed Construction
“receiver” as “receiver without a demodulator” Otherwise, no construction necessary	“a receiver that converts the second optical signal from optical to electronic form to recover the data carried by the second optical signal”

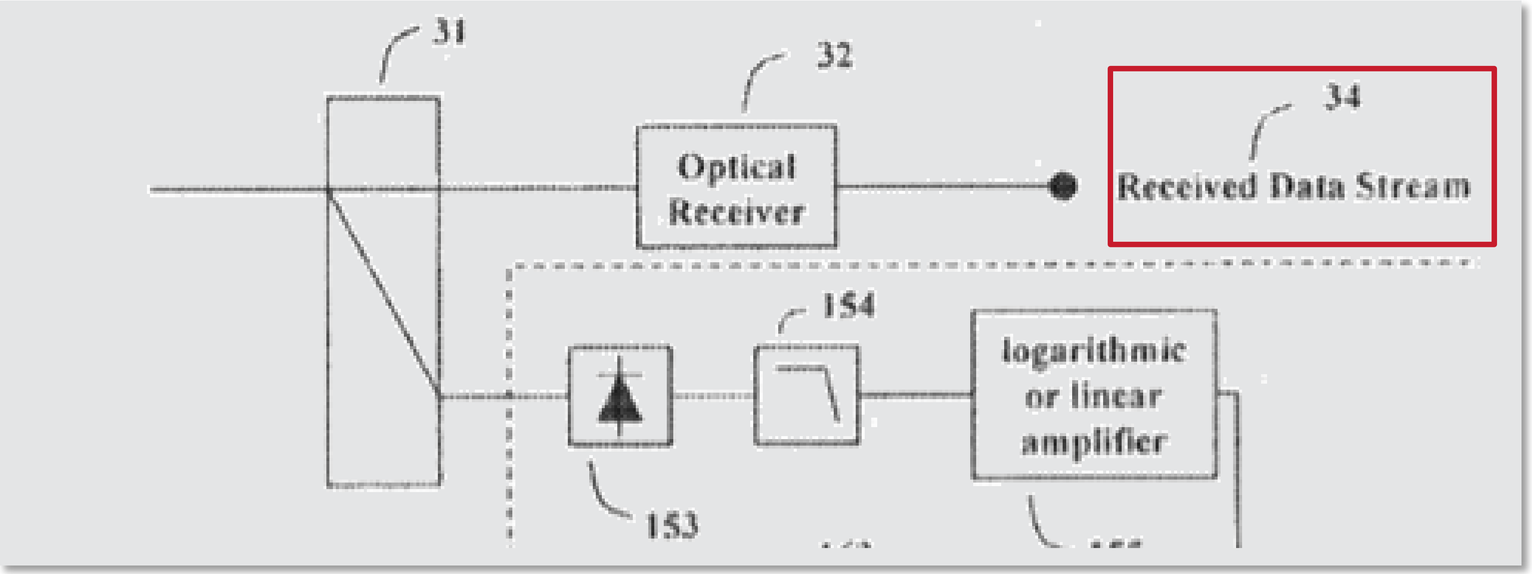
<u>Tentative Construction</u>:
“receiver” as “receiver without a demodulator”
Otherwise, no construction

AT THE TIME OF THE ’898 PATENT INVENTION, COULD OPTICAL SIGNALS BE CONVERTED TO SOMETHING OTHER THAN ELECTRONIC FORM TO DERIVE DATA?

The Asserted Patents Only Disclose Direct Detect Systems that Directly Convert Optical Signals to Electronic Form to Recover the Data

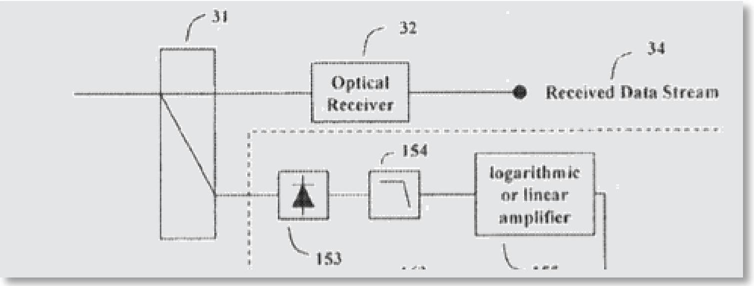
OTDR **132**. Splitter **31** then splits off a portion of the remaining other light, directing part of the optical energy to an energy level or tap detector **33** and passes the residual light to an optical receiver **32**. Optical receiver **32** converts the optical signal from optical to electronic form to recover the electronic data stream **34** as appropriate for the optical modulation technique employed.

'898 patent at 4:66-5:5



'898 patent at Fig. 3 (Excerpt)

The Asserted Patents Only Disclose Direct Detect Systems that Directly Convert Optical Signals to Electronic Form to Recover the Data



’898 patent at Fig. 3 (Excerpt)

located on a card, which fits into the box. The laser amplitude modulator typically pulses or alters the laser output to create an amplitude-modulated optical signal representative of the electronic data stream. The laser amplitude modulator and laser thus define a transmitter for transmitting the optical signal over an optical fiber. A receiver for the amplitude-modulated optical signals of the optical data typically includes a photodiode to convert the optical signals back into the electronic data stream. Both the transmitter and the receiver typically are located on the backplane of a single card, which is replaceable should a component fail.

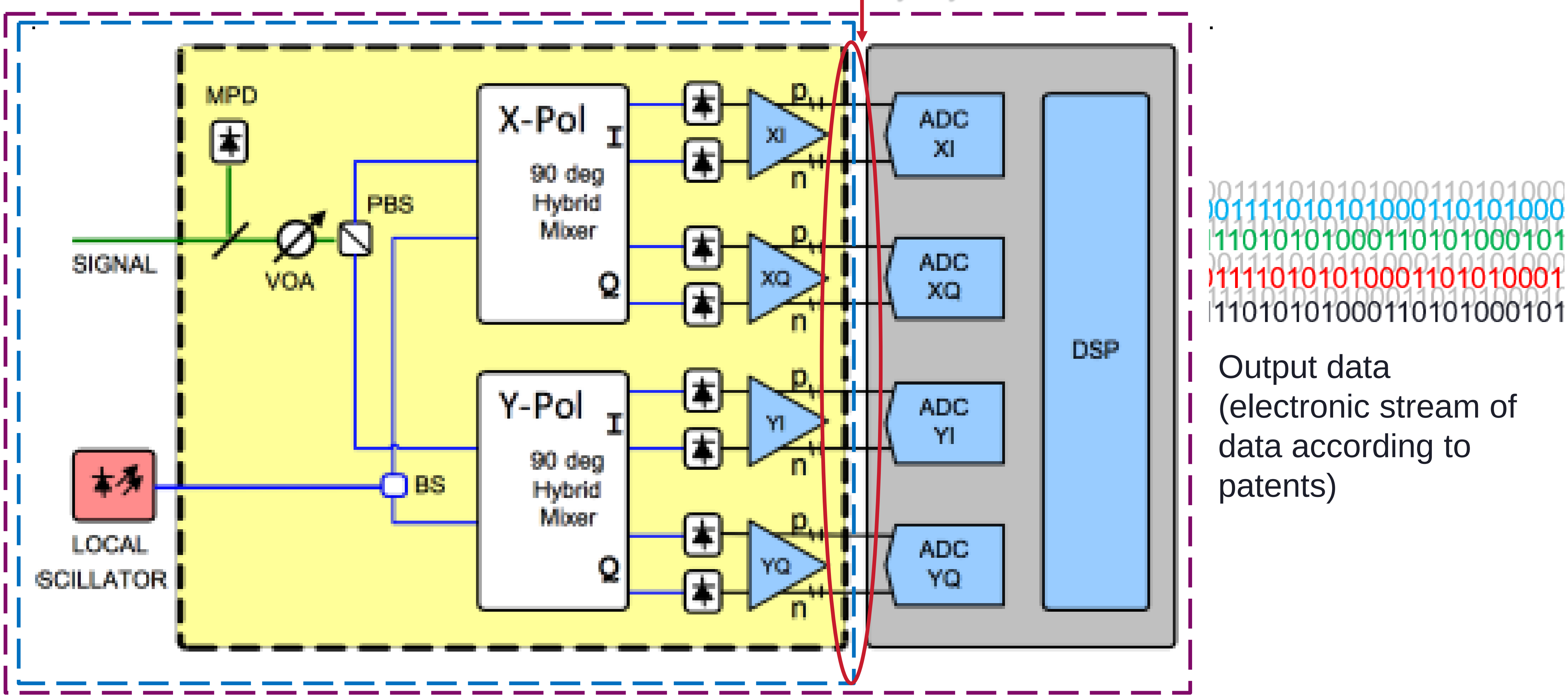
* * *

The reading of the amplitude-modulated optical data signals using the photodiode on the card is straightforward: the optical signals either produce an electric output at the photodiode or they do not. As a result, an output electronic data stream of zeros and ones is generated.

’898 patent at 1:27-46

Oyster Accuses Data Other Than Data that Was Modulated Onto the Optical Signal By The Transmitter As "Output Data," Thus Creating *O2 Micro Issue* Requiring Construction

Data accused by Oyster



Output data (electronic stream of data according to patents)

Oyster's 898 patent Infringement Contentions at 12 (showing receiver from 100G standard)

“PHASE MODULATE” / “PHASE MODULATOR”

’327 PATENT AT CLAIMS 3, 16, 27, 37
’511 PATENT AT CLAIM 9
’898 PATENT AT CLAIMS 3, 17

Oyster’s Proposed Construction	Ciena’s Proposed Construction
“alter the phase of light to create an optical signal having a phase that is representative of data. Use of phase modulation excludes use of amplitude modulation.”	“alter the phase of light while keeping the amplitude of the light constant to create an optical signal having a phase that is representative of data.”

Tentative Construction:
“alter the phase of light without intentionally altering amplitude to create an optical signal having a phase that is representative of data”

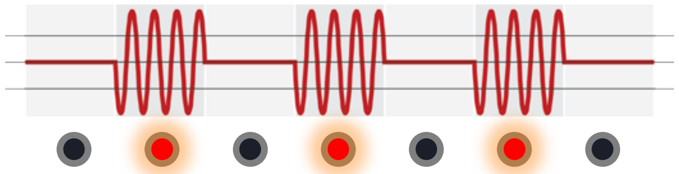
THE PARTIES APPEAR TO AGREE THAT AMPLITUDE MODULATION IS NOT PART OF PHASE MODULATION. BUT OYSTER ARGUES THAT CIENA'S CONSTRUCTION IMPROPERLY EXCLUDES AMPLITUDE MODULATION. IS THAT NOT THE CASE FOR OYSTER'S CONSTRUCTION AS WELL?

Oyster’s Construction Properly Excludes Amplitude Modulation

Oyster’s Proposed Construction

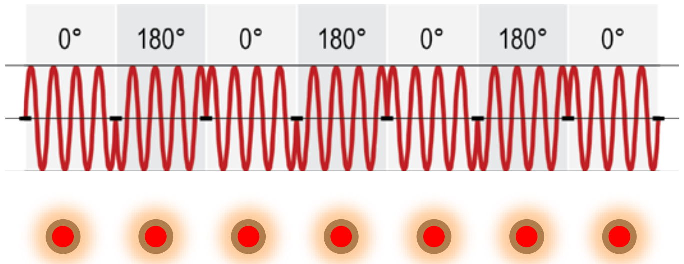
“alter the phase of light to create an optical signal having a phase that is representative of data. Use of phase modulation excludes use of amplitude modulation.”

AMPLITUDE MODULATED OPTICAL SIGNAL



The data is represented by the intensity (brightness) of an amplitude modulated signal

PHASE MODULATED OPTICAL SIGNAL



The data is represented by the phase of a phase modulated signal

Light properties that can be changed to represent data, at the time of the invention, include:

- Amplitude
- Phase

Oyster’s construction covers modulating data on the phase and expressly excludes modulating data on the amplitude (“excludes use of amplitude modulation”).

CIENA'S CONSTRUCTION GOES BEYOND REQUIRING PHASE MODULATION TO NOT ALTER AMPLITUDE TO REQUIRE THAT IT ACTIVELY KEEP THE AMPLITUDE CONSTANT. IS THAT THE ORDINARY UNDERSTANDING OF PHASE MODULATORS?

Oyster's Invention is Predicated on Receipt of A Phase Modulated Signal With A Constant Amplitude

used. The phase-modulated signals have the advantage that breach detection by the energy level detector work more effectively, since the amplitude of the optical signal is constant and thus a drop in the optical signal level is more easily detected.

'898 patent at 4:48-52.

Detector **33** monitors the light energy in the fiber **111** via the light energy coupled to the detector by splitter **31**. If the amplitude drops during monitoring, which may indicate a tap, the detector **33** provides an alert and can, for example, send and electronic signal to the processor via bus **135** to indicate a drop or increase in the optical energy level, sound an alarm or alert network maintenance personnel, for example through an LED **133** or by sending an alarm message using transmitter **10**. Another LED **134** can provide an indication of proper

'898 patent at 5:11-19.

While the cards may be placed in new boxes, the present invention also permits for the removal of existing optical transmission cards to be easily replaced by the enhanced security cards. The fibers are disconnected, the box **2** is simply opened and the amplitude-modulated-based card is removed. The card **1** is inserted into the bus **6** and the fibers are connected.

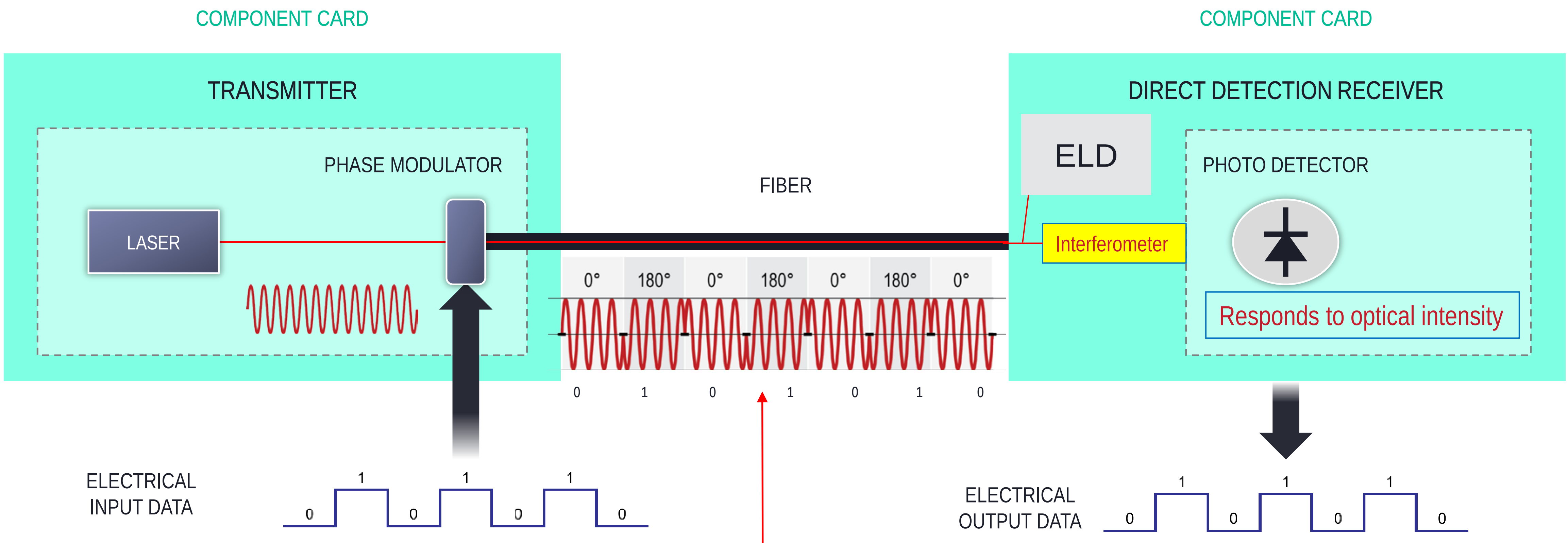
The card **1** of the present invention may thus provide existing boxes with continual breach localization and detection secure transmission mode capability.

'898 patent at 6:36-45.

DID PHASE MODULATORS AT THE TIME OF THE INVENTION ACTIVELY STABILIZE AMPLITUDE?

IF NOT, WOULD A CONSTRUCTION THAT PHASE MODULATORS “ALTER THE PHASE OF LIGHT WITHOUT ALTERING AMPLITUDE” (OR WITHOUT “INTENTIONALLY” ALTERING AMPLITUDE) BETTER CAPTURE CIENA’S MEANING?

Oyster's Invention is Predicated on Receipt of A Phase Modulated Signal With A Constant Amplitude

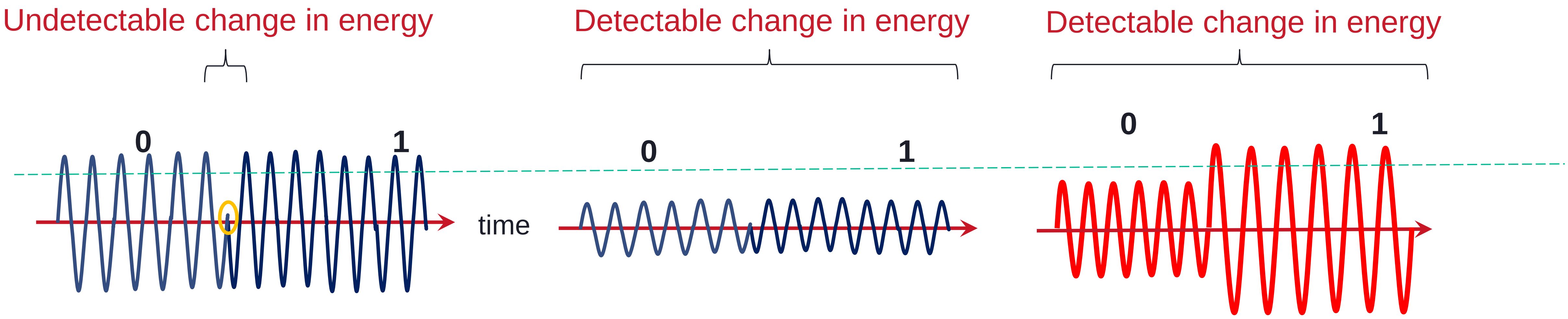


used. The phase-modulated signals have the advantage that breach detection by the energy level detector work more effectively, since the amplitude of the optical signal is constant and thus a drop in the optical signal level is more easily detected.

'898 patent at 4:48-52.

IS THERE A MAGNITUDE ISSUE HERE? IN OTHER WORDS, DOES THE AMPLITUDE CHANGE THAT OCCURS DURING PHASE MODULATION FALL BELOW SOME THRESHOLD, SUCH THAT AMPLITUDE IS STILL "SUBSTANTIALLY" CONSTANT, COMPARED TO AMPLITUDE MODIFICATION?

The Amplitude Change During A Phase Shift Is Not Detectable (light undergoes 430 trillion cycles per second)



WHAT DOES THE "PATENTED SECURE PHASE MODULATED FORMAT" IN EXHIBIT M (OYSTER'S WHITE PAPER) REFER TO? IS THERE ANOTHER PATENT THAT COVERS THE MODULATION FORMAT?

Oyster's Paper and Patent Both Describe Network Operators Monitoring for Taps

OYSTER OPTICS, Inc.

Securing Fiber Optic Communications against Optical Tapping Methods

Optical tapping devices placed in public and private optical networks today allow unfettered access to all communications and information transiting any fiber segment. Available legally and inexpensively from numerous manufacturers worldwide, optical taps are standard network maintenance equipment that are in use daily. When used nefariously, optical taps provide an excellent method of intercepting voice and data communications with virtually no chance of being detected. Intruders are therefore rewarded with a bounty of relevant information while subject to a very low risk of being caught. Optical network equipment manufacturers do not currently incorporate adequate protection and detection technologies in their platforms to monitor such network breaches in real-time. Network operators thus cannot safeguard the optical signals on their networks and therefore cannot prevent the extraction of sensitive data and communications. Government networks, while assuredly more secure, are also vulnerable to certain types of advanced passive and active tapping methods. This background paper serves to provide an overview of the vulnerabilities of today's modern optical networks; describe methods of addressing such issues; and introduce Oyster Optics' patented optical security, monitoring, intrusion detection and breach localization solutions.

INTRODUCTION

Fiber optic telecommunications systems make up the backbone of all modern communications networks. Whether voice, data, video, fax, wireless, email, TV or otherwise, over 180 million miles of fiber optic cables worldwide transport the ever-increasing majority of our diverse information and communications. Modern economies and societies rely on the availability, confidentiality and integrity of critical fiber optic network infrastructures to function properly and efficiently.

With the initial introduction of fiber optic telecommunications systems came the belief that fiber-based transmissions are inherently secure. It has since been proven that not only are fiber optic systems simple to tap, but in many respects they are simpler to tap than their copper-based predecessors. Furthermore, tapped optical networks divulge much greater pertinent information in a more orderly and digitized manner. In fact, many fiber optic taps are standard network maintenance equipment used daily by carriers worldwide. Used illicitly, however, such devices *allow the extraction of all voice and data communications in the fiber plant with little or no chance of detection.*

This is achieved because the light within the cable contains all the information in the transmitted signal and can be easily captured, interpreted and manipulated with standard off-the-shelf tapping equipment. Private and public networks today do not incorporate methods for detecting optical taps in real-time, offering an intruder a relatively safe data extraction proposition. As fiber optic systems transmit large volumes of data as light within an optical fiber, such methods are thus a preferred low-risk method of intelligence gathering, reaping access to large amounts of information. From an eavesdropping and espionage point-of-view the benefits are obvious.

Today we live in a society where corporate espionage has become an international sport. As communications using fiber optics become increasingly ubiquitous, so too does the potential for the illegal tapping and

1

Ex. M (Oyster Optics White Paper)

technologies. In addition, due to the nature of the optical signal sent using Oyster Optics' patented secure phase modulation technologies, attempts to tap Oyster-protected fiber, along with the attempted tap location in the fiber plant, become immediately known to the network operator via highly-sensitive intrusion detection technologies. The optical signal is thus

Ex. M at 11

Preferably, the energy level detector provided on the card for measuring light energy in a fiber is connected electronically to an alarm, so that when a drop or increase in the energy level is detected, which may indicate a tap, the card may provide an alarm signal, for example an electronic signal sent to a network operations center to indicate a drop or increase in the optical energy level, a light on the outside of the box or a sound-emitting alarm. Depending upon the optical transmis-

'898 patent at 3:22-29

ciena

Oyster's Paper and Patent Both Describe Intrusion Detection with Tunable Thresholds

OYSTER OPTICS, Inc.

Securing Fiber Optic Communications against Optical Tapping Methods

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1

Ex. M (Oyster Optics White Paper)

2. ***Intrusion Detection:*** Highly-sensitive monitoring of various intrusion and maintenance events with fine-tunable thresholds allows immediate alerts of network penetration attempts.

Ex. M at 12

signal reception. An energy level detector control circuit **233** controls the alarm threshold and energy detection and pro-

'898 patent at 5:20-21

The electrical signal, after being scaled by the linear or logarithmic amplifier **155**, is compared to reference voltages by one or more comparators. As shown in FIG. **3**, comparator

'898 patent at 5:60-6:2

Oyster's Paper Mentions A Phase Modulation Format That is Different From Phase Modulation Available in Existing Products

OYSTER OPTICS, Inc.

Securing Fiber Optic Communications against Optical Tapping Methods

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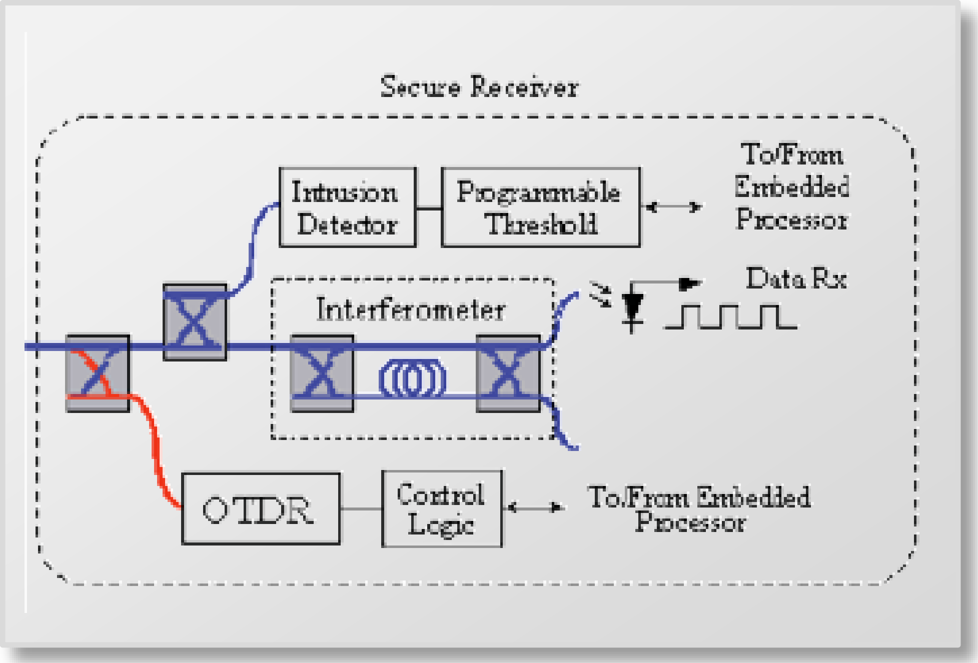
Ex. M (Oyster Optics White Paper)

Even though the input and output electronic data streams to the multiplexors and switches remain the same, the light transmitting the data is in a patented secure phase modulated format different from any commercially available products. Because of the format of the light, Oyster Optics' technologies are therefore able to provide an extremely precise and sensitive tap detection system, which would not function with existing common equipment utilizing insecure amplitude or intensity modulated signals. Furthermore, Oyster Optics integrates an Optical Time Domain Reflectometer ("OTDR") to instantaneously locate the exact source of an intrusion or maintenance event and determine its origins, such as an actual tap, a physical line break, or even simple fiber degradation.

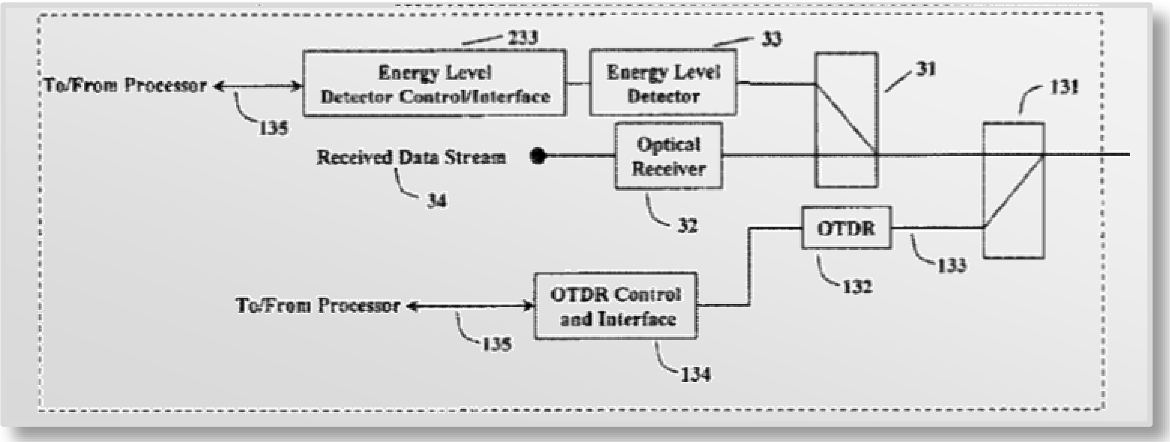
Ex. M at 14

Oyster's Paper and Patents Include Identical Receivers

Ex. M (Oyster Optics White Paper)



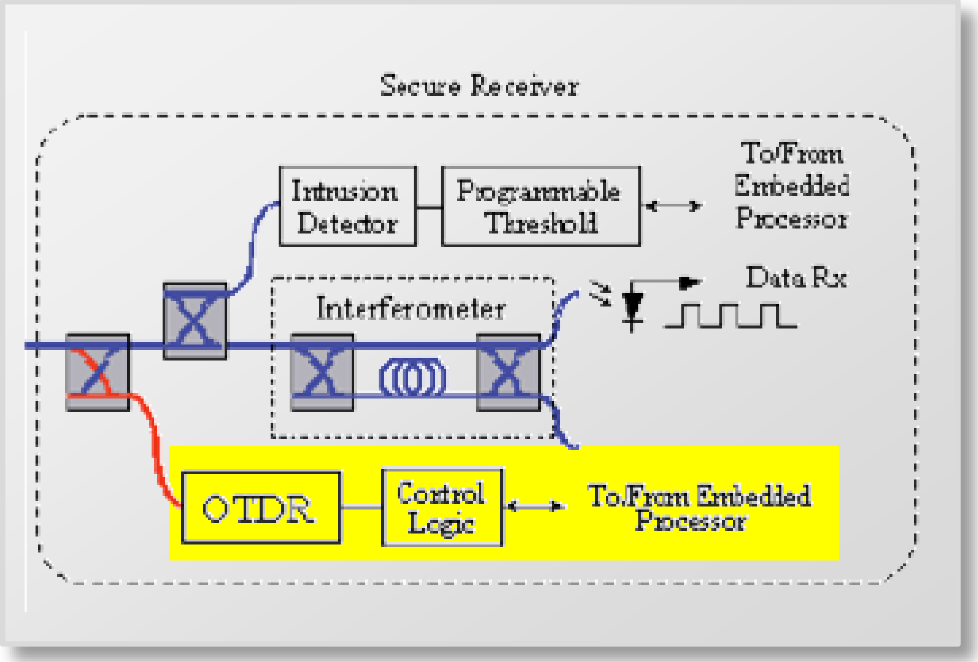
Ex. M at 15



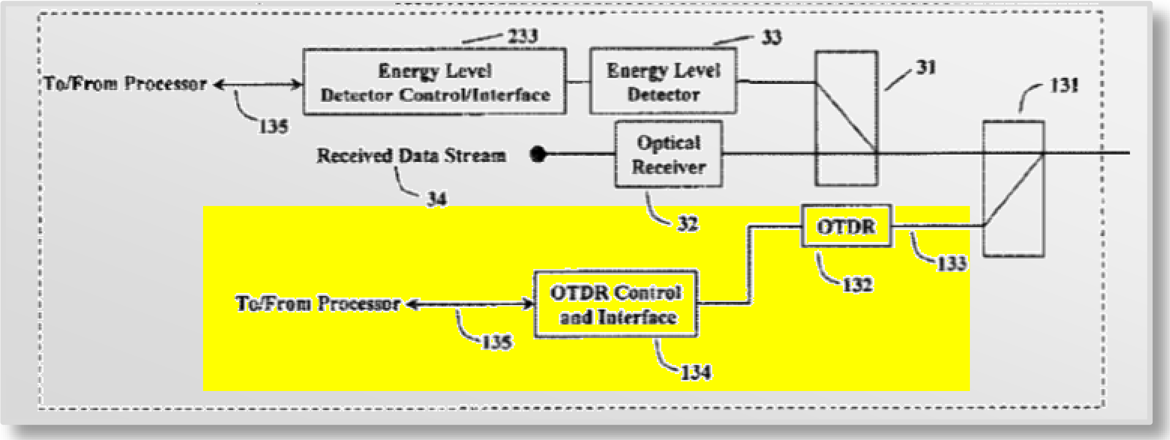
'898 Patent at Fig. 2

Oyster’s Paper and Patents Include Identical Receivers

Ex. M (Oyster Optics White Paper)



Ex. M at 15



’898 Patent at Fig. 2

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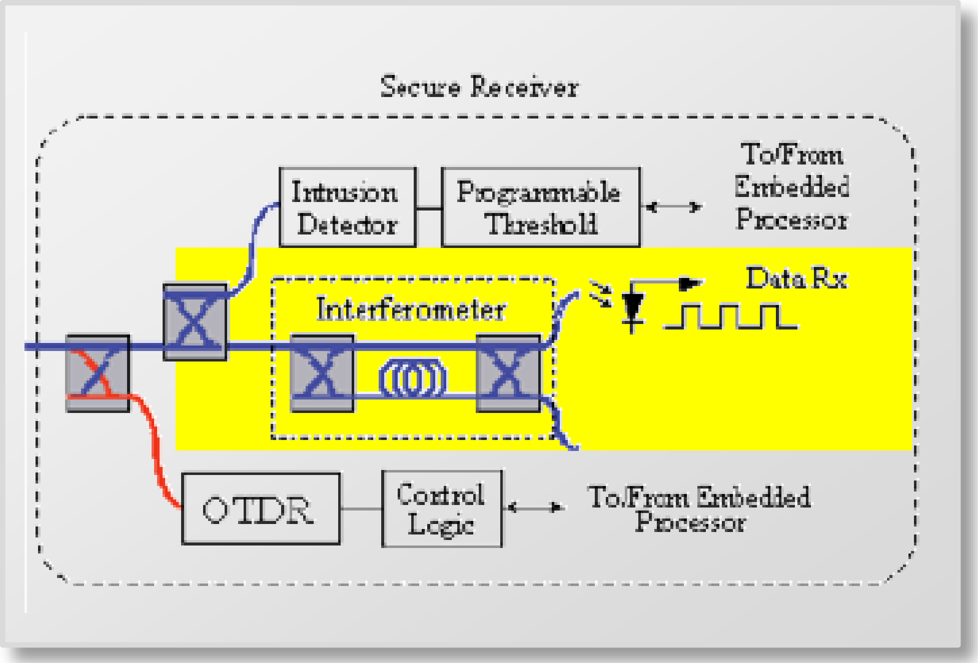
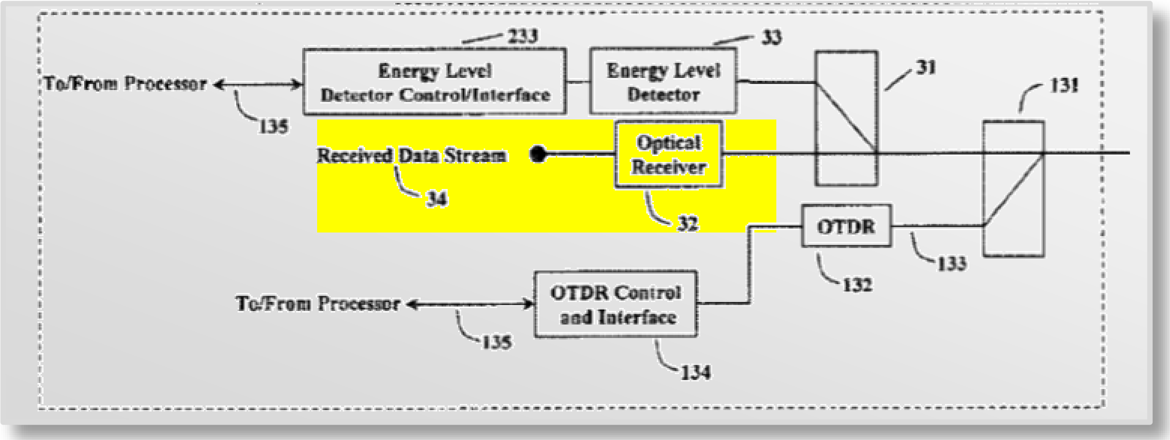
Ex. M (Oyster Optics White Paper)



Ex. M at 15



'898 Patent at Fig. 2

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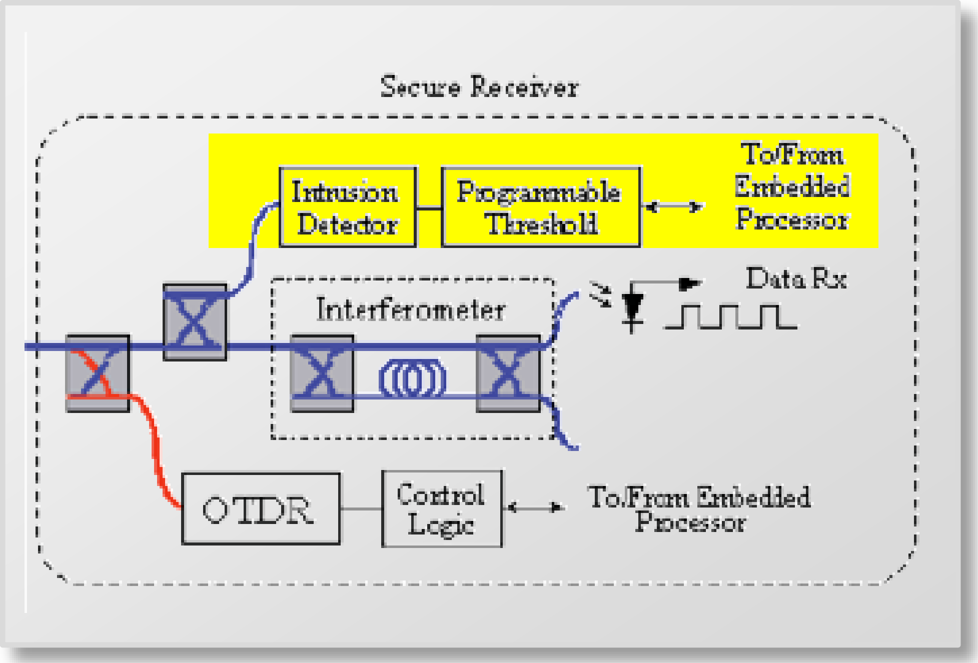
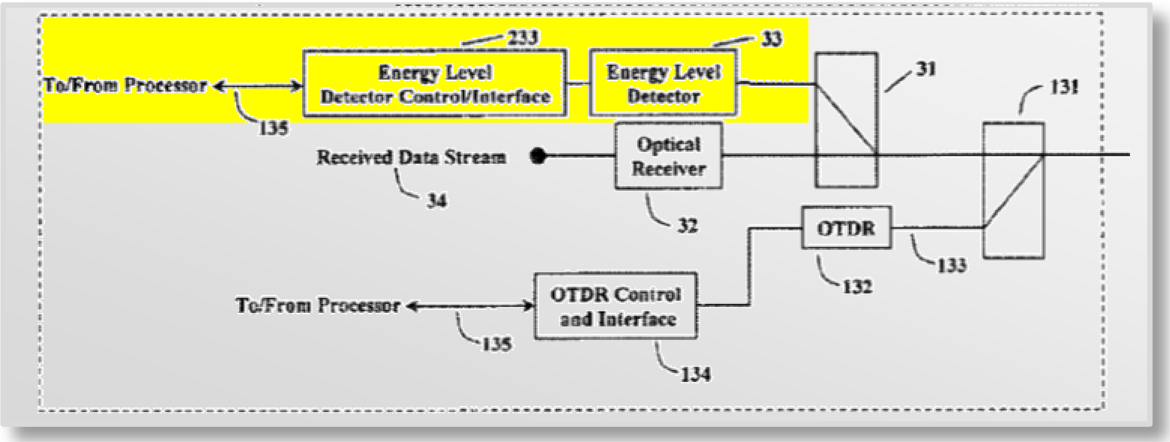
Ex. M (Oyster Optics White Paper)

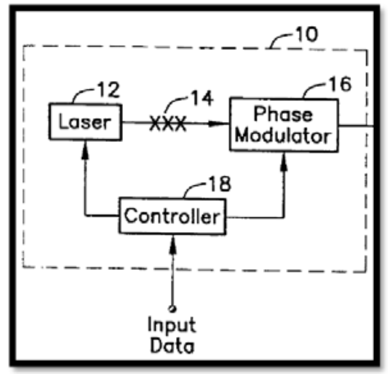


Ex. M at 15

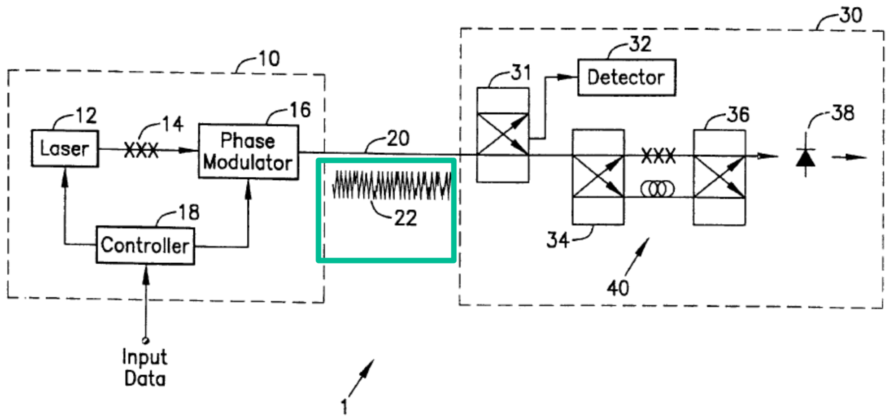


'898 Patent at Fig. 2

Oyster's Patent On an Interferometer Also Includes A Detector for Measuring Phase Modulated Signals With A Constant Amplitude



Dkt. No. 97 at 19:8-16 (citing a portion of Fig. 1 of Ex. EE).

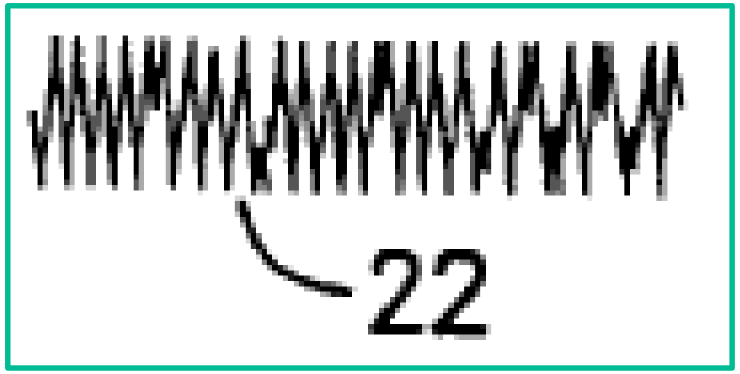


Ex. EE at Fig. 1.

Fig. 1

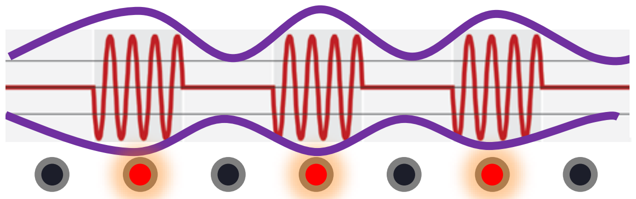
Optical signal **22** of FIG. **1**, which has a constant maximum amplitude, then passes to receiver **30**. Splitter **31** splits off a portion of the light, directing part of the optical energy to the light-monitoring detector **32** and passing the remaining light to the interferometer **40**. A detector **32**, for example a light energy detector, monitors the light energy in the fiber **20** via the light energy coupled to the detector by splitter **31**, the light energy being a function of the amplitude. If the amplitude drops, most likely from a tap, the detector alerts the receiver and can, for example, sound an alarm or alert network maintenance personnel. Additionally, since the

Ex. EE at 4:33-43.

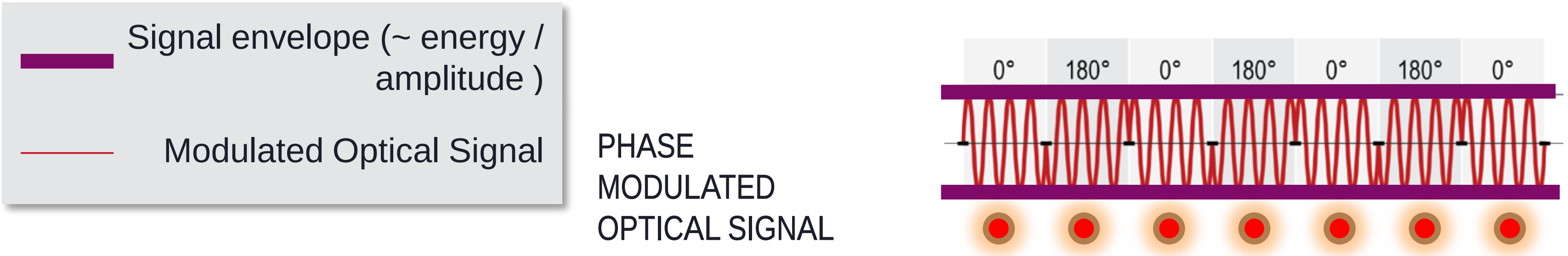


HOW COMMON WERE “CONTINUOUS PHASE MODULATION” AND OTHER TECHNIQUES THAT PHASE MODULATED SIGNALS WHILE KEEPING THE AMPLITUDE CONSTANT AT THE TIME OF THE INVENTIONS OF THE ASSERTED PATENTS?

Oyster's Invention Is Predicated On Phase Modulated Signals *With* Constant Amplitude



The intensity (brightness) of an amplitude modulated signal is ***not constant***



The intensity (brightness) of an ideal phase modulated signal is ***constant***

used. The phase-modulated signals have the advantage that breach detection by the energy level detector work more effectively, since the amplitude of the optical signal is constant and thus a drop in the optical signal level is more easily detected.

'898 patent at 4:48-52

Oyster's Inventions in This Space Repeatedly Refer to Phase Modulated Signals with a Constant Amplitude (Energy) at the Receiver

Optical signal 22 of FIG. 1, which has a constant maximum amplitude, then passes to receiver 30. Splitter 31 splits off a portion of the light, directing part of the optical energy to the light-monitoring detector 32 and passing the remaining light to the interferometer 40. A detector 32, for example a light energy detector, monitors the light energy in the fiber 20 via the light energy coupled to the detector by splitter 31, the light energy being a function of the amplitude. If the amplitude drops, most likely from a tap, the detector alerts the receiver and can, for example, sound an alarm or alert network maintenance personnel. Additionally, since the

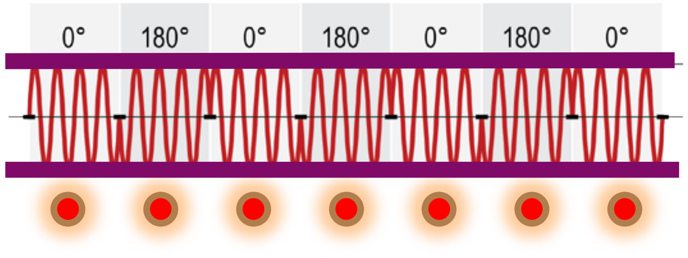
Ex. EE at 4:33-43

used. The phase-modulated signals have the advantage that breach detection by the energy level detector work more effectively, since the amplitude of the optical signal is constant and thus a drop in the optical signal level is more easily detected.

'898 patent at 4:48-52

Preferably, an energy level detector is also provided on the card for measuring light energy in a fiber. Because the transmitter is typically transmitting in secure mode using a continuous wave laser, the energy level read by the detector should be constant. When a drop in the energy level is detected, which may indicate a tap, the card may provide an alarm signal, for example a light on the outside of the box or a sound-emitting alarm.

'592 patent at 2:63-3:3 (Snawerdt)



“A TRANSMITTER HAVING A LASER, A MODULATOR, AND A CONTROLLER”

’327 PATENT AT CLAIMS 1, 14, 25, 36
’898 PATENT AT CLAIMS 1, 14

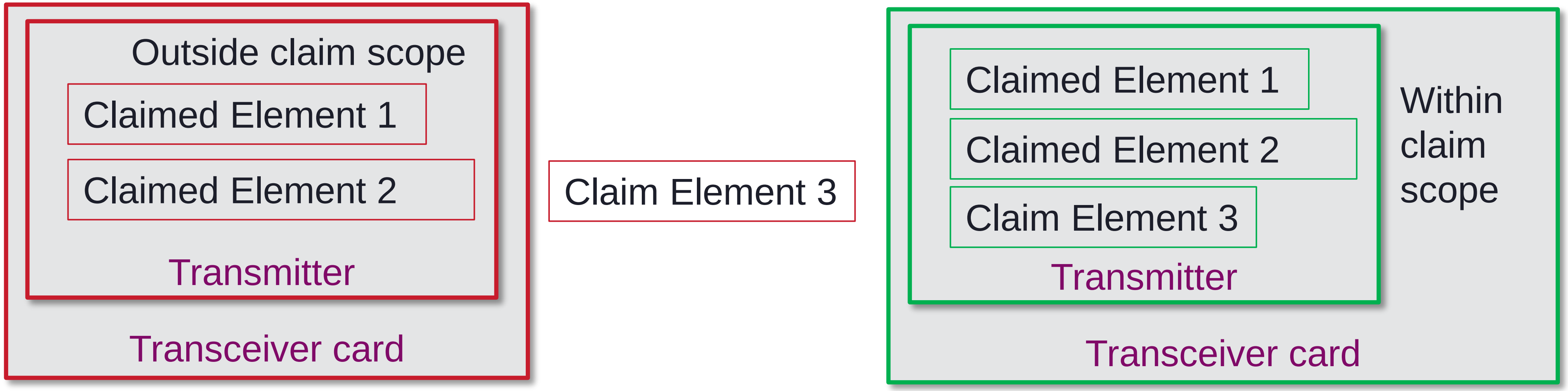
Oyster’s Proposed Construction	Ciena’s Proposed Construction
No construction necessary: “a transmitter having a laser, a modulator, and a controller.”	“a transmitter having a laser, modulator, and a controller located within the transmitter.”

<u>Tentative Construction</u>:
“a transmitter containing a laser, a modulator, and a controller.”

IS THERE A SUBSTANTIVE DIFFERENCE BETWEEN A TRANSMITTER "HOLDING, INCLUDING, OR CONTAINING" THE LASER, MODULATOR, AND CONTROLLER, AND THOSE ELEMENTS BEING LOCATED WITHIN THE TRANSMITTER?

A Transmitter "Holding, Including, or Containing" the Laser, Modulator, and Controller Does Not Cover A Transmitter With One or More of Those Elements Off the Transmitter or Transceiver Card

a transmitter having a laser, a modulator, and a controller



directed to a claimed "transceiver card." Further, the transceiver card must include a transmitter "having a laser" on the transceiver card. '898 patent, 6:52-56.

See, e.g., Ex. V at 19 (Oyster Argument in IPR2017-01870)

Moreover, Ade fails to suggest implementing a laser or light source on the same card as Ade's "transceiver" or "transmitter."[11] These defects in Ade's

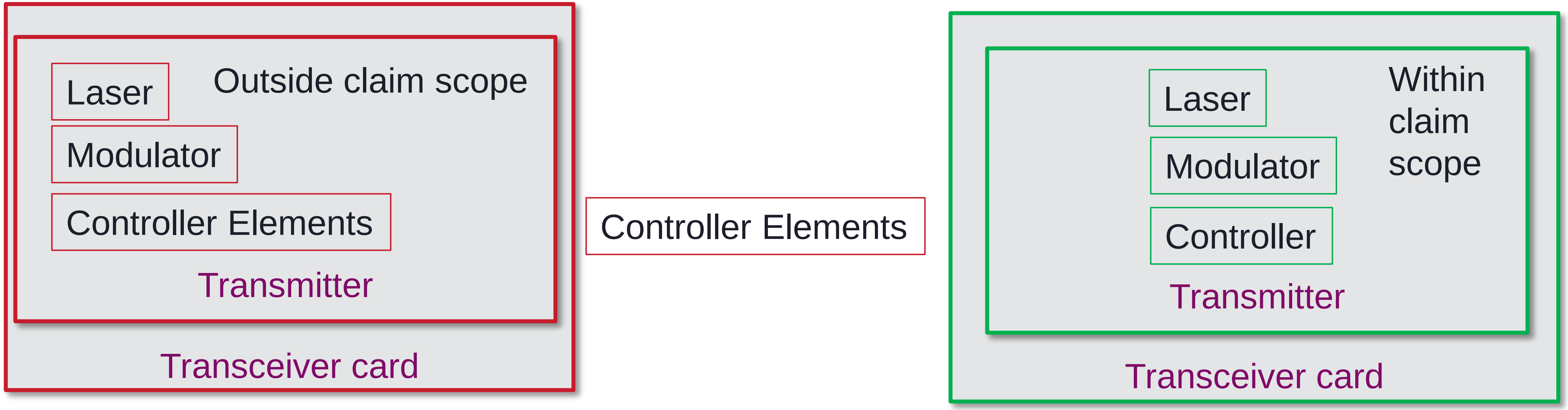
Ex. V at 22 ((Oyster Argument in IPR2017-01870)

to a POSITA. Ade instructs that the transmitter receives light from an ***external light source***. Ade fails to teach or suggest modifying a transmitter to include a light source on the same transceiver card as the transmitter.

In summary, neither Treyz nor Ade discloses or suggests including a "transmitter having a laser" and a receiver all on a transceiver card. Given this

See, e.g., Ex. V at 22 (Oyster Argument in IPR2017-01870)

A Transmitter "Holding, Including, or Containing" the Laser, Modulator, and Controller Does Not Cover A Transmitter With One or More of Those Elements Partially On and Partially Off the Transmitter



All three claims 1, 14, and 25 require a laser within the transmitter itself and also an energy level detector on the same card as the transmitter. All three claims 1, 14, and 25 further require a first optical fiber over which data is transmitted and a second optical fiber over which data is received.

Ex. BB at 8 (PTAB Decision IPR2017-01871).

Oyster Expressly Argued that the Claims Require A Transceiver Card With Claimed Transmitter With Each Element On The Card

A transceiver card . . ., the transceiver card comprising:
a transmitter having a laser, a modulator, and a controller configured to receive input data and control the modulator to generate a first optical signal as a function of the input data;

denied because they are fundamentally flawed. As introduced above, claim 1 is directed to a claimed "transceiver card." Further, the transceiver card must include a transmitter "having a laser" on the transceiver card. '898 patent, 6:52-56.

Ex. V at 19 (Oyster Argument in IPR2017-01870) (see also Ex. D at 24)

argument divorced from the factual evidence. Notably, Choy's system includes only a single transmission wavelength and a single reception wavelength per Laser/Receiver Card (LRC) 20 and Input/Output Card 14 pair (*see* Choy, 3:3-5), and does not include every claimed feature of the '327 patent claims on a single transceiver "card." Thus, whatever reduction in the size of form factors was allegedly available as of the critical date, even Choy chose to implement separate cards to perform separate functions on separate wavelengths.

Ex. O at 35 (Oyster Argument in IPR2017-02173)

Oyster Expressly Argued that the Claims Require A Transceiver Card With Claimed Transmitter With Each Element Provided In It

A transceiver card . . ., the transceiver card comprising:
a transmitter having a laser, a modulator, and a controller configured to receive input data and control the modulator to generate a first optical signal as a function of the input data;

Petitioners' obviousness conclusion for the "transmitter having a laser" limitation also does not mention placing a "transmitter having a laser" on a "transceiver card." Pet., 25-26. Petitioners allege that "a POSITA would have

Ex. U at 41 (Oyster Argument in IPR2018-00070)

on multiple cards." Swanson, 4:19-34. Swanson, however, does not describe which elements are provided in a transmitter to "convert electrical signals … to optical signals," and, in particular, there is no disclosure or suggestion of a card with a "transmitter having a laser" in Swanson.

Ex. U at 42 (Oyster Argument in IPR2018-00070)

Oyster's Invention Centered On Ability to Exchange Existing Cards with Oyster's Security Cards

While the cards may be placed in new boxes, the present invention also permits for the removal of existing optical transmission cards to be easily replaced by the enhanced security cards. The fibers are disconnected, the box **2** is simply opened and the amplitude-modulated-based card is removed. The card **1** is inserted into the bus **6** and the fibers are connected.

'898 patent at 6:36-42.

The present invention also provides a method for providing a continually-operating or, preferably, a commanded operation OTDR within an existing box including the steps of:

removing an existing transceiver card; and

replacing the transceiver card with the card of the present invention.

'898 patent at 3:36-42.

Transceiver Cards: When implemented at the transceiver card level, Oyster Optics' technology takes advantage of already existing optical and electrical components in the transceiver cards and their accompanying multiplexors or other terminal equipment. Transceiver cards are the least expensive, most easily swappable components in an optical network, and due to the life of laser components, need to be replaced more frequently than other networking equipment.

Thus network operators may replace existing non-secure transceiver cards in multiplexors and switches with secure transceiver cards containing Oyster Optics' technologies, either proactively in routes where need demands or through regular attrition. The cost differential between a

Ex. M at 14

Backup Slides

"ENERGY LEVEL DETECTOR INCLUDING A THRESHOLD" / "ENERGY LEVEL DETECTOR INCLUDES A PLURALITY OF THRESHOLDS"

’327 PATENT AT CLAIMS 1, 14, 25; ’898 PATENT AT CLAIMS 1, 14

Oyster’s Proposed Construction	Ciena’s Proposed Construction
"an energy level detector" means "a device to measure optical power." Otherwise, no construction necessary	"a single energy level detector on a transceiver card and including a reference voltage for comparison to the energy level of [the optical signals / the second optical signal]" "a single energy level detector on a transceiver card and including reference voltages for comparison to the energy level of [the optical signals / the second optical signal]"

<u>Tentative Construction</u>:
a single energy level detector on a transceiver card including a threshold / a plurality of thresholds," with the clarification that the transceiver may have additional (unclaimed) energy level detectors

DOES CIENA CONTEND THAT THE TRANSCEIVER CANNOT HAVE MORE THAN ONE ENERGY LEVEL DETECTOR?

The Transceiver Can Have More Than One Energy Level Detector, But The Energy Level Detector That Is Accused of Infringement Must Have The Claimed Functionality

detector includes ***a plurality of thresholds***." '898 patent, 7:1-4. By its plain language, claim 1 requires an energy level detector to measure an energy level of an optical signal and include a plurality of thresholds. This does not encompass multiple energy level detectors for measuring multiple optical signals, where each of the multiple energy level detectors has a threshold. The correct interpretation is consistent with Fig. 3 of the '898 patent, which depicts multiple thresholds (163, 164) being compared to a measured energy level (output of element 155)

Ex. S at 36 (Patent Owner Preliminary Response IPR2018-00070)

DOES OYSTER CONTEND THAT THE CLAIMED THRESHOLDS MAY BE LOCATED ON DIFFERENT ENERGY LEVEL DETECTORS?

Oyster's Position Before the PTAB is that One Detector Must Measure of the Claimed Threshold(s) and The Claimed Thresholds Must Be on the Card

detector includes ***a plurality of thresholds***." '898 patent, 7:1-4. By its plain language, claim 1 requires an energy level detector to measure an energy level of an optical signal and include a plurality of thresholds. This does not encompass multiple energy level detectors for measuring multiple optical signals, where each of the multiple energy level detectors has a threshold. The correct interpretation is consistent with Fig. 3 of the '898 patent, which depicts multiple thresholds (163, 164) being compared to a measured energy level (output of element 155)

Ex. S at 36 (Patent Owner Preliminary Response IPR2018-00070)

argument divorced from the factual evidence. Notably, Choy's system includes only a single transmission wavelength and a single reception wavelength per Laser/Receiver Card (LRC) 20 and Input/Output Card 14 pair (*see* Choy, 3:3-5), and does not include every claimed feature of the '327 patent claims on a single transceiver "card." Thus, whatever reduction in the size of form factors was allegedly available as of the critical date, even Choy chose to implement separate cards to perform separate functions on separate wavelengths.

Ex. O at 35 (Patent Owner Preliminary Response IPR2017-02173)

AT THE TIME OF THE ’327 AND ’898 PATENT INVENTIONS, COULD ENERGY THRESHOLDS IN A TRANSCEIVER BE IMPLEMENTED USING SOMETHING OTHER THAN REFERENCE VOLTAGES?

The Energy Thresholds Were Implemented With Reference Voltages

coupler/splitter 31. The output of photodetector 153 is an electrical voltage whose level correlates to the optical power

’898 patent at 5:33-34

The electrical signal, after being scaled by the linear or logarithmic amplifier 155, is compared to reference voltages by one or more comparators. As shown in FIG. 3, comparator 156 will transition from a low to high output when the voltage output from the logarithmic or linear amplifier 155 exceeds the reference voltage established by the digital to analog (D to A) converter 158. Conversely, comparator 157 will transition from a low to high output when the voltage output from the logarithmic or linear amplifier 155 falls below the reference voltage established by the digital to analog converter 159. The

’898 patent at 5:60-6:2

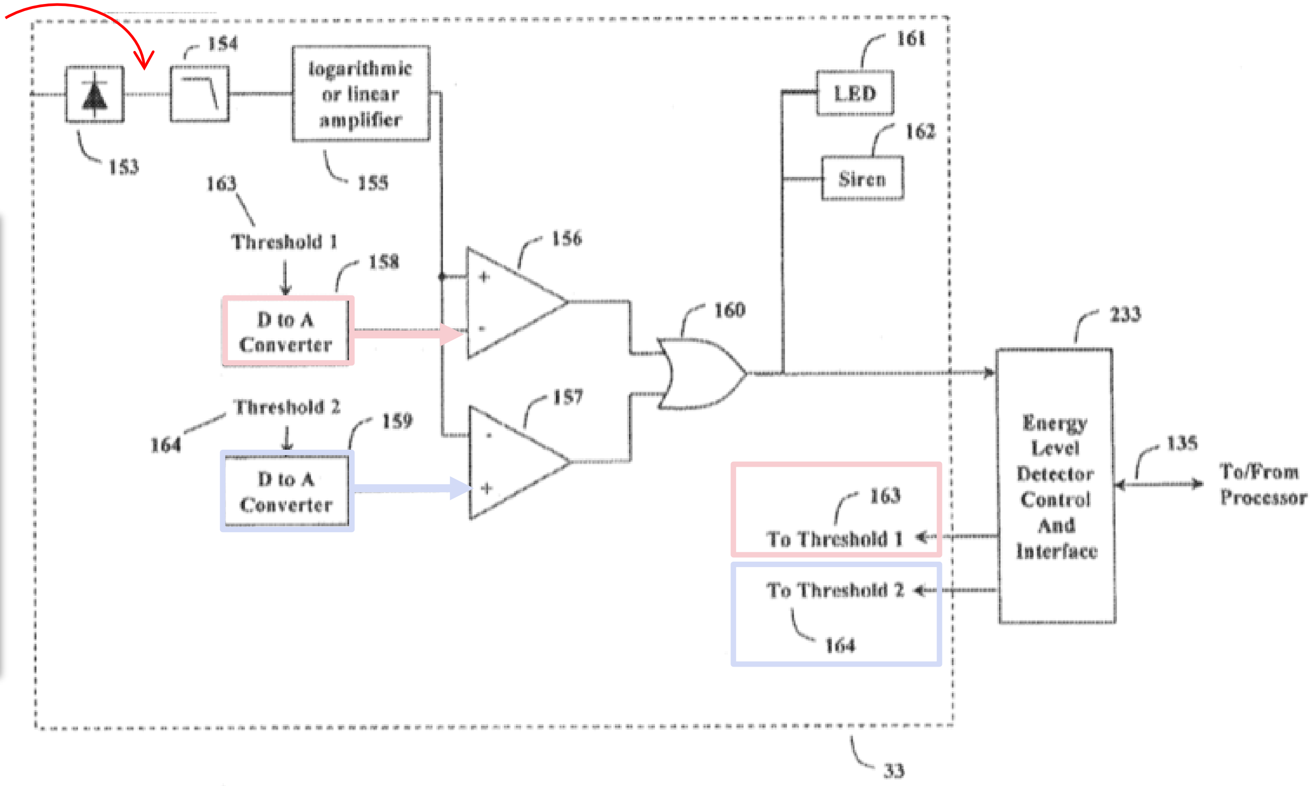


Figure 3